REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Claims 3, 5, and 9 have been canceled.

This amendment adds, changes and/or deletes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

After amending the claims as set forth above, claims 1, 2, 4, 8, 11, 13, 14, 18, and 20-24 are now pending in this application.

Rejections under 35 U.S.C. § 103

Claims 1-5, 8, 11, 13, 14, 18, and 20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,392,248 to Takahara *et al.* (hereafter "Takahara") in view of U.S. Patent No. 6,429,430 to Sato *et al.* (hereafter "Sato"), U.S. Patent No. 5,545,899 to Tran *et al.* (hereafter "Tran"), and U.S. Patent No. 6,384,417 to Okumura *et al.* (hereafter "Okumura"). This rejection is respectfully traversed.

Amended claim 1 recites a phosphor sheet for a radiation detector provided to be attached to a photoelectric conversion film of the radiation detector, comprising a support having a sheet shape; and a phosphor layer which emits light in response to rays of radiation transmitted through a specimen, and including a layer coated on said support with powder of a rare earth oxysulfide phosphor activated by europium of concentration in a range of 0.01 mol% to 3.5 mol%, wherein the rare earth oxysulfide phosphor powder has an average particle size in a range of 2 μm to 15 μm, wherein a filling factor of the phosphor powder in the phosphor layer is in a range of 60% to 80%, and the phosphor layer has a thickness in a range of 80 to 300 μm, and the rare earth oxysulfide phosphor has a composition expressed by: general formula: $(R_{1-a}Eu_a)_2O_2S$, wherein, in the general formula, R is at least one kind of element selected from Gd, Lu, Y and La, and a is a number which satisfies $1 \times 10^{-4} \leq a \leq 3.5 \times 10^{-2}$, wherein said phosphor layer has a surface that is configured to be bonded onto the photoelectric conversion film by an adhesive that transmits light, wherein the photoelectric conversion film includes an amorphous silicon film or a single crystal silicon film, wherein

the surface has a surface roughness of 0.5 μm or less in average roughness Ra. Claims 2, 4, and 8 depend from claim 1.

Amended claim 11 recites a radiation detector, comprising a phosphor sheet configured to convert radiation rays transmitted through a specimen into light, wherein the phosphor sheet comprises: a support having a sheet shape, and a phosphor layer including a layer coated on said support with powder of a rare earth oxysulfide phosphor activated by europium of concentration in a range of 0.01 mol% to 3.5 mol%, wherein the rare earth oxysulfide phosphor powder has an average particle size in a range of 2 μm to 15 μm, wherein a filling factor of the phosphor powder in the phosphor layer is in a range of 60% to 80%, and the phosphor layer has a thickness in a range of 80 to 300 μm, and the rare earth oxysulfide phosphor has a composition expressed by: general formula: $(R_{1-a}Eu_a)_2O_2S$, wherein, in the general formula, R is at least one kind of element selected from Gd, Lu, Y and La, and a is a number which satisfies $1 \times 10^{-4} \leq a \leq 3.5 \times 10^{-2}$, a photoelectric conversion film on which said phosphor sheet is layered, and which converts the light from said phosphor sheet into electric charges, wherein the photoelectric conversion film comprises an amorphous silicon film or a single crystal silicon film; and a charge information reading section having a plurality of pixels in contact with said photoelectric conversion film and reading out the electric charges generated on said photoelectric conversion film for each of the plurality of pixels as image signals of the radiation rays, wherein said phosphor layer has a surface bonded onto the photoelectric conversion film by an adhesive that transmits light, wherein the surface has a surface roughness of 0.5 μm or less in average roughness Ra. Claims 13, 14, 18, and 20 depend from claim 11.

Applicant notes that a phosphor layer made of powder can experience light scattering between the phosphor layer and a photoelectric conversion film, which can deteriorate the definition of an image formed by such a device. However, a phosphor sheet, or a radiation detector with such a phosphor sheet, that has a surface roughness, filling factor, and thickness of claims 1 and 11 has an improved definition and resolution of a radiation image.

Takahara discloses a color light emission sheet 4 that includes a flexible sheet base 6 and a phosphor layer 7 disposed on the sheet 6. See Takahara at col. 7, line 63, to col. 8, line 2. Takahara discloses that the color light emission sheet 4 can be made by mixing phosphor particles with a binder, adding a solvent to prepare a phosphor coating liquid, and coating the

liquid onto the sheet base 6 and drying the liquid to form the phosphor layer 7. See Takahara at col. 10, lines 33-41. However, Takahara does not disclose or suggest that the phosphor layer 7 has a thickness in a range of 80 to 300 μm or that the phosphor layer 7 has a surface with a surface roughness of 0.5 μm or less in average roughness Ra, as recited in claims 1 and 11.

Sato discloses a scintillator panel 2 that includes a scintillator 12, a substrate 10, first transparent organic film 14, a transparent inorganic film 16, and a second transparent organic film 18. See Sato at col. 3, lines 9-32. However, Sato does not disclose or suggest a phosphor layer that has a thickness in a range of 80 to 300 μm or a phosphor layer that has a surface with a surface roughness of 0.5 μm or less in average roughness Ra, as recited in claims 1 and 11.

Tran discloses a radiation detection panel 10 that includes a flat substrate 14, individual photosensitive modules 12, a phosphor layer 16, and a protective front plate 18. See Tran at col. 4, lines 58-67. Tran discloses that the phosphor may be coated on a separate sheet or glass substrate and then glued to the photosensitive modules 12. See Tran at col. 5, lines 56-58. However, Tran does not disclose or suggest a phosphor layer that has a thickness in a range of 80 to 300 μm or a phosphor layer that has a surface with a surface roughness of 0.5 μm or less in average roughness Ra, as recited in claims 1 and 11.

Okumura discloses a ceramic scintillator that is produced by sintering particles and heat treating the sintered body. See Okumura at col. 2, lines 59-65; col. 3, lines 2-6; col. 4, lines 50-53; col. 7, lines 2-18. Okumura discloses that the mean surface roughness of the sintered body is greater than or equal to 0.01 μm and smaller than or equal to 0.8 μm. However, Okumura does not disclose or suggest does not disclose or suggest a phosphor layer that has a thickness in a range of 80 to 300 μm. Nor does Okumra disclose or suggest a phosphor layer that has a surface with a surface roughness of 0.5 μm or less in average roughness Ra because the ceramic scintillator of Okumura is a rod-like scintillator. Therefore, the surface roughness teachings of Okumura are inapplicable as teachings of a surface roughness value for a layer made of powder because the teachings of Okumura regard a different physical form.

Matsuda discloses an x-ray detector that includes a scintillator 1 and a photodiode 2 that are optically connected by a transparent adhesive 3. See col. 2, line 66, to col. 3, line 3,

of Matsuda. However, Matsuda does not disclose or suggest a phosphor layer that has a thickness in a range of 80 to 300 μm or a phosphor layer that has a surface with a surface roughness of 0.5 μm or less in average roughness Ra, as recited in claims 1 and 11.

It would not have been obvious to one of ordinary skill in the art to combine the teachings of Takahara, Sato, Tran, Okumura, and Matsuda to provide the phosphor sheet of claim 1 and the radiation detector of claim 11. The combination of Takahara, Sato, Tran, Okumura, and Matsuda is neither suggested nor does it disclose or suggest the combination of the features recited in claims 1 and 11, including a phosphor layer that has a thickness in a range of 80 to 300 μm and a surface with a surface roughness of 0.5 μm or less in average roughness Ra. Therefore, it would not have been obvious to combine these references to provide the phosphor sheet of claim 1 and the radiation detector of claim 11.

For at least the reasons discussed above, reconsideration and withdrawal of this rejection is respectfully requested.

Claim 9 is rejected under 35 U.S.C. § 103(a) as being unpatentable Takahara, Sato, Tran, Okumura, and Matsuda as applied to claim 1 above, and further in view of U.S. Patent No. 6,394,650 to Ohara *et al.* (hereafter "Ohara"). This rejection is respectfully traversed. Claim 9 has been canceled. Reconsideration and withdrawal of this rejection is respectfully requested.

Claims 21-24 are rejected under 35 U.S.C. § 103(a) as being unpatentable Takahara, Sato, Tran, Okumura, and Matsuda as applied to claims 1 and 11 above, and further in view of U.S. Patent No. 4,032,791 to Chiola *et al.* (hereafter "Chiola"). This rejection is respectfully traversed. Chiola fails to remedy the deficiencies of Takahara, Sato, Tran, Okumura, and Matsuda as discussed above in regard to independent claims 1 and 11, from which claims 21-24 depend. Reconsideration and withdrawal of this rejection is respectfully requested.

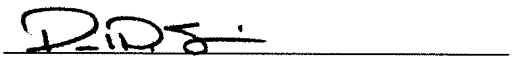
Conclusion

Applicant submits that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing or a credit card payment form being unsigned, providing incorrect information resulting in a rejected credit card transaction, or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date 7/30/08 By 

FOLEY & LARDNER LLP
Customer Number: 22428
Telephone: (202) 672-5540
Facsimile: (202) 672-5399

Paul D. Strain
Attorney for Applicant
Registration No. 47,369